SECTION 7.0

MECHANICAL INTEGRITY TESTING

SASOL CHEMICALS (USA), LLC

2020 HWDIR EXEMPTION PETITION REISSUANCE REQUEST

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7.0 MECHANICAL INTEGRITY TESTING

7.1 INTRODUCTION

In accordance with 40 CFR 146.68(d), Class I hazardous waste injection wells undergo an annual mechanical integrity test (MIT) to determine the integrity of the injection well's long string casing, injection tubing, annular seal, and bottom-hole cement. This federal testing requirement also corresponds with the Texas Commission on Environmental Quality (TCEQ) Underground Injection Control (UIC) Permit requirements listed under Texas Administrative Code (TAC) 331.64(d). Additionally, under 40 CFR §148.20(a)(2)(iv), facilities must submit the results of an annulus pressure test and a radioactive tracer test performed within one year prior to submission of any exemption reissuance.

Data contained in this section describes the 2018 testing of each well and demonstrates the continued mechanical integrity of Plant Well No. 1 (WDW147) and Plant Well No. 2 (WDW319). Results of the 2018 annual testing shows that each well is properly constructed to prevent movement of waste into either an underground source of drinking water (USDW) or into any other unauthorized formation. Depths listed in this section are referenced to the respective radioactive tracer survey logs, which were tied into the packer depth in each well.

The mechanical integrity tests were performed in accordance with these requirements over the time as specified in the table below.

Well No.	Test Dates	Annulus Pressure Test	Radioactive Tracer Survey	Bottomhole Pressure Test
WDW147	November 14-15, 2018	X	X	X
WDW319	November 16-17, 2018	X	X	X

Testing demonstrates that both Plant Well No. 1 (WDW147) and Plant Well No. 2 (WDW319) meet the requirements specified under 40 CFR §148.20(a)(2)(iv).

7.2 PLANT WELL 1 (WDW147)

7.2.1 Mechanical Integrity Test

Geostock Sandia, LLC (GKS) conducted the annulus pressure test on Plant Well No. 1 (WDW147) the morning of November 15, 2018. The test was performed under dynamic conditions by pressurizing the annulus to a minimum of 100 pounds per square inch (psi) over the well's maximum allowable surface injection pressure (MASIP) of 600 psig. GKS attached a digital recording pressure gauge to the annulus of Plant Well No. 1 (WDW147), and the annulus was pressurized to 800 psig with a tubing injection pressure of 70 psia. The starting test pressure was measured at 809.1 psig. After 30 minutes, the annular pressure had increased to 823.0 psig. The pressure increase of 13.9 psi over the test period represents a change of 1.7 percent, indicating a successful test. A graph and a digital record of the annulus pressure test data are included in Appendix 7-1.

Coastal Wireline Services (CWS) conducted the RTS on Plant Well No. 1 (WDW147) on November 15, 2018. A copy of the survey and an interpretation letter are included in Appendix 7-2. The radioactive tracer test tool was run in the well and the top of fill was located at a depth of 6,728 feet, indicating that the lowermost 52 feet of the 140-foot perforated completion interval is covered by solids in the borehole. Statistical checks with the radioactive tracer test tool were recorded at 6,460 feet (above packer) and 6,600 feet (20 feet above uppermost perforations). The initial baseline gamma ray pass was recorded from 6,726 to 6,250 feet. There were no indications of any areas of unusually high gamma activity on the initial baseline pass.

Two moving flow profile surveys were performed in the well. The tracer material was monitored between 6,250 feet and 6,728 feet, with the radioactive slugs exiting through the perforated completion into the injection interval. The surveys were conducted using facility wastewater at an injection rate of 110 gpm.

Two constant-injection stationary time-drive surveys were recorded for 17 minutes while injecting test fluid at 250 gpm, each with the tool's lower gamma ray detector positioned at 6,600 feet (20 feet above the uppermost perforation). The surveys showed no evidence of upward fluid flow. A final baseline logging pas from 6,726 feet to 6,250 feet indicated that no residual radiation was recorded, and that the completion interval had returned to background level ands. The table below includes a summary of the radioactive tracer test logging runs.

Plant Well 1 (WDW147) Radioactive Tracer Survey Logging Summary

RUN NO.	RATE (gal/min)	PRESSURE (psig)	OPERATION
1-2	0	40	Statistical background checks at 6,460 feet and 6,600 feet
3	0	40	Initial baseline gamma ray log from 6,726 feet to 6,250 feet.
4-6	110	100	Ejected Slug 1 at 6,200 feet. Monitored flow profile with three passes.
7-9	110	100	Ejected Slug 2 at 6,200 feet. Monitored flow profile with three passes.
10	250	200	Ejected Slug 3 at 6,589 feet. Ran 17-minute time drive at 6,600 feet.
11	250	200	Ejected Slug 4 at 6,589 feet. Ran 17-minute time drive at 6,600 feet.
12	0	60	Ran final baseline gamma ray log from 6,726 feet to 6,250 feet. feet to 6,200 feet.

Note: Upper detector is located five feet above radioactive source and lower detector is eleven feet below source.

The results of the moving and stationary surveys demonstrate that:

- All wellbore fluid is exiting through the completion into the injection sand interval, and
- No fluid is flowing vertically out of the injection sand interval behind the casing.

7.3 PLANT WELL 2 (WDW319)

7.3.1 Mechanical Integrity Test

The annulus pressure test for Plant Well No. 2 (WDW319) was conducted on November 17, 2018. GKS attached a digital recording pressure gauge to the annulus of Plant Well No. 2 (WDW319). The annulus pressure test was run under dynamic conditions with a tubing injection pressure of 56 psia. The pressure in the annulus was increased to exceed a value of 100 psi over the well's MASIP of 1,200 psig. The starting test pressure was measured at 1,331.2 psig at 09:10 a.m. and the test was initiated. After 30 minutes, the annular pressure had increased to 1,341.1 psig. The resulting pressure change of 9.9 psi represents a pressure increase of 0.7 percent over the 30-minute testing period, successfully demonstrating mechanical integrity. A graph of the test data and a digital record of the annulus pressure test data are included in Appendix 7-3.

Coastal Wireline Services (CWS) conducted the radioactive tracer test survey on Plant Well No. 2 (WDW319) on November 18, 2018. A copy of the survey and an interpretation letter are included in Appendix 7-4. A soft bottom was tagged at approximately 7,129 feet, and the RTS tool was lowered through this soft fill to a depth of approximately 7,200 feet. The lowermost perforations within the completion interval from: 7,130 to 7,144 feet; 7,216 to 7,236 feet; and 7,240 to 7,260 feet are covered by this soft fill. Statistical checks recorded at 6,478 feet (above packer) and 6,830 feet (above perforations). An initial baseline gamma ray pass was recorded from 7,200 to 6,300 feet, with no indications of any areas of unusually high gamma activity. Two moving flow profile surveys were performed, and the tracer material was monitored between depths of 6,300 feet and 7,129 feet, with the radioactive slugs exiting through the completion perforations out into the injection interval.

Two constant-injection stationary time-drive surveys were then conducted to demonstrate that injected fluids were remaining within the permitted injection zone. Two time-drive surveys were conducted at 6,830 feet (20 feet above the uppermost perforations) for 16 minutes each while injecting at 297 gpm, respectively. No evidence of upward flow was recorded on the time-drive surveys. The following table includes a summary of the radioactive tracer test logging runs.

Plant Well 2 (WDW319) Radioactive Tracer Survey Logging Summary

RUN NO.	RATE (gal/min)	PRESSURE (psig)	OPERATION
1-2	0	40	Statistical background checks at 6,478 feet, and 6,830 feet.
3	0	40	Ran initial baseline gamma ray log from 7,199 feet to 6,300 feet.
4-7	102-120	100-200	Ejected Slug 1 at 6,300 feet. Monitored flow profile with four passes.
8-12	120	200	Ejected Slug 2 at 6,300 feet. Monitored flow profile with five passes.
13	297	280	Ejected Slug 3 at 6,819 feet. Ran 16-minute time drive at 6,830 feet.
14	297	280	Ejected Slug 4 at 6,819 feet. Ran 16-minute time drive at 6,830 feet.
15	0	60	Ran final baseline gamma ray log from 7,129 feet to 6,300 feet.

Note: Upper detector is located five feet above radioactive source and lower detector is eleven feet below source.

The results of the moving and stationary surveys demonstrate that:

- All wellbore fluid is exiting through the completion into the injection interval, and
- No fluid is flowing vertically out of the injection zone behind the casing.

7.4 SUMMARY

Results from the 2018 annulus pressure tests and radioactive tracer tests indicate that Plant Well No. 1 (WDW147) and Plant Well No. 2 (WDW319) both have mechanical integrity. Therefore, compliance under the requirements of 40 CFR §148.20(a)(2)(iv), that facilities must submit the results of an annulus pressure test and a radioactive tracer test performed within one year prior to submission of any exemption reissuance, is satisfied.

REFERENCES

Geostock Sandia, LLC, 2018, Well Test Report for Plant Well No. 1 (WDW147) for Sasol Chemicals (USA), LLC, Greens Bayou Plant: Houston, Texas

Geostock Sandia, LLC, 2018, Well Testing Report for Plant Well No. 2 (WDW319) for Sasol Chemicals (USA), LLC, Greens Bayou Plant: Houston, Texas